

portable apparatus **100-1** according to the present embodiment is the touch panel **105-1** placed in the back surface of the apparatus **100-1**. According to such a configuration, the user may hold the body of the apparatus **100-1** in natural position, i.e., with both hands gripping respective right and left edge portions of the apparatus **100-1**. The user may perform the gesture input by applying force on the main body of the apparatus **100-1** with the hands as well as transparently performing the coordination input by arbitrary moving a finger placed on the touch panel **105-1**.

[0324] According to such computer interface, complex interactions may be performed with a hand-held type computer without using a keyboard, mouse nor pen. Further, there is no problem of occluding the visibility of the visual display **106-1** of the apparatus **100-1**. By combining such computer interface with a portable apparatus that has only a small display, comfortable operation environment may be provided. Preferably, the portable apparatus **100-1** has a form factor that makes it easy for the user to perform the gesture input interaction with applying force on the apparatus' main body while performing another interaction for the coordination input with moving the finger on the touch panel **105-1**.

[0325] In the portable apparatus **100** in accordance with the present embodiment, a further operation may be performed on a certain position, which is designated in response to the gesture input, at the same time as performing the coordination input on display information or a GUI object provided in the visual display **106-1**. Such a simultaneous data input method for the portable apparatus **100** of the present embodiment is described below.

[0326] (1) Combination of Coordination Input and Continuous Force Control:

[0327] In this case, the user's force applied on the main body of the apparatus is mapped to an analog value in an interface control. For example, when a map is displayed on the visual display **106-1**, a map scale may be controlled in accordance with an output of the force sensor **101-1** that detects a user's physical interaction at the same time as indicating a position on the map by using the touch panel **105-1** placed in the back surface of the apparatus **100-1**. If an amount of bending resulting from the application of force on the apparatus **100-1** is less than a predetermined value, the map scale displayed on the visual display **106-1** may be increased or decreased based on the sensor output that corresponds to the amount of bending or the force applied. Alternatively, if the apparatus **100-1** has a rigid body and would not distort, in reality, by the application of force, the tactile display **109-1** may be utilized for providing a feedback of the applied force on the apparatus **100-1** to the user by using the analog value detected.

[0328] (2) Combination of Coordination Input and Force Control Beyond Threshold Value:

[0329] If the user applies force on the apparatus **100-1** and the force is equal or greater than a predetermined threshold value, GUI operations such as issuing a command to the system, switching interface status or operation mode, or the like may be performed. For example, the user may view a menu by moving a selector position to the menu with using the touch panel **105-1**. After such selection is completed, the user may perform physical interaction so as to bend the main body of the apparatus **100-1**. If force applied through the physical interaction reaches the predetermined threshold, a corresponding menu command may be executed. Alternatively,

a notification to the user may be performed with the tactile display **109-1** so as to confirm validity of such physical interaction.

[0330] (3) Coordination Input and Gesture Based Force Control:

[0331] A force pattern applied on the main body of the apparatus **100** may be recognized and interpreted as a specific command. For example, the user may designate a position in the map displayed on the visual display **106-1** by scanning the touch panel **105-1**, and then apply force to bend the apparatus **100** twice in a short period of time, thereby switch a screen display.

[0332] Similarly, various gestures may be generated by, for example, bending the main body of the apparatus **100-1** twice or a plural times in the same direction or the opposite direction, or bending at different time, or bending with a predetermined interval. Further, successful interpretation of the physical interaction and successful execution of the corresponding command may be notified to the user by, for example, using the tactile display **109-1**.

[0333] FIG. 26 shows a system operation utilizing the gesture input in flowchart form. Procedures described in the flowchart are realized, in practice, by the processor unit **108-1** that initiates a predetermined program codes, and performs simultaneous and transparent processing of the gesture input and the coordination input through the touch panel **105-1**.

[0334] First, input coordination values (X, Y) with the touch panel **105-1**, and a force F detected by the force sensor **101-1** or a gesture detected by the bend sensor **102-1**, the pressure sensor **103-1** and/or the rotation sensor **104-1** are inputted (Step S1). If the user performs the gesture (Step S2), for example, bending the apparatus **100** twice, a tactile feedback is provided to the user using the tactile display **109-1** (Step S3) and a predetermined action is performed such as displaying a menu (Step S4). If no gesture of the user is detected, reading of input data is continued (Step S5). If the coordination input with the touch panel **105-1** is performed, a GUI object corresponding to the coordination input is searched (Step S6).

[0335] Next, the designated GUI object is checked if it is a selectable object such as a menu item or hyper link (Step S7). If the designated GUI object is the selectable one, the force F applied on the apparatus **100-1** with the gesture input is checked if it is larger than a predetermined threshold or if a level of the gesture input is larger than a predetermined level (Step S8).

[0336] If the force F is larger than the predetermined threshold, the inputted gesture is validated and a command based on the coordination input, such as execution of selected menu or searching of the hyperlink, is issued (Step S10) after a tactile feedback is returned to the user using the tactile display **109-1** (Step S9). If the gesture input is not validated because of less force F than the predetermined threshold, the reading of input data is continued (Step S11).

[0337] If it is determined that no selectable object is designated in Step S7, the current GUI object is checked if it has a controllable attribution, such as a scale, color, size or the like, that can be continuously controlled (Step S12). If the GUI object has the continuous controllable attribution, the force F applied on the apparatus **100-1** or any other inputted gesture is mapped to a control value, such as zooming of the map display, or its deviation (Step S13).